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EXAMINER

IQBAL, KHAWAR

ART UNIT	PAPER NUMBER
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2686

DATE MAILED: 06/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/802,165

Applicant(s)

CHUN ET AL.

Examiner

Khawar Iqbal

Art Unit

2686

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) \_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-25,28-43 are rejected under 35 U.S.C. 102(e) as being unpatentable by Kuwahara et al (6597679).

3. Regarding claim 1 Kuwahara et al teaches a base station device in a mobile station where a mobile station receives forward information signals in a plurality of paths according to a communication environment with respect to a forward information signal transmitted from an antenna array having a plurality of antennas in a base station, extracts forward fading information signals for the plurality of paths from the forward information signals, and transmits a reverse signal including the forward fading information signals to the base station, the base station device comprising (col. 2, lines 1-41):

a receiver for receiving the reverse signal through the antenna array, processing the reverse signal received through the antenna array (101), and extracting forward fading information from the received reverse signal ( col. 7, lines 13-20 and 33-47);

a beam formation controller for generating weight vectors to be assigned to the antennas of the antenna array based on forward fading powers (col. 8, lines 33-37) and array vectors indicating direction of a forward signal estimated from the received reverse signal for the plurality of paths, so that the intensity of a transmission beam pattern steered from the antennas in a direction to the mobile station is large (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 7, lines 1-43, col. 8, lines 24-50); and

a transmission beam generator for applying the weight vectors to the antennas (col. 2, lines 30-41, col. 8, line 40-col. 9, line 11).

Regarding claim 3 Kuwahara et al teaches a forward fading power calculator for calculating a forward fading power for each path based on the extracted forward fading information (col. 7, lines 13-47); an array vector calculator for calculating an array vector for each path from the reverse signal; a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50); and a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to the transmission beam generator (col. 2, lines 30-41, col. 8, line 40-col. 9, line 11).

Regarding claim 4 Kuwahara et al teaches a mobile station device for receiving a forward information signal in a plurality of paths according to a communication

environment from an antenna array having a plurality of antennas in a base station, comprising (figs. 2):

a receiver for receiving forward information signals from the plurality of paths with respect to the forward information signal transmitted from the base station (col. 7, lines 1-47);

a forward processor for extracting forward fading power information signals for the plurality of paths from the received forward information signals (col. 3, lines 13-31, col. 6, lines 13-62, col. 7, lines 1-43); and

a transmitter for multiplexing a transmission message signal with the forward fading power information signals received from the forward processor (col. 8, line 39-col. 9, line 10).

Regarding claim 5 Kuwahara et al teaches a forward fading estimator for estimating forward fading information for each path from which the forward information signals are received; and a forward fading encoder for combining the forward fading information for the plurality of paths and encoding the combined forward fading information (col. 8, line 39-col. 9, line 10).

Regarding claim 6 Kuwahara et al teaches a base station device having an antenna array, for receiving forward fading information from a mobile station in a mobile communication system, comprising (col. 2, lines 1-41):

a reverse processor for processing a reverse signal received through the antenna array (col.3, lines 33-40);

a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 3, lines 13-31, col. 6, lines 13-62, col. 7, lines 1-43);

a beam formation controller for generating a weight vector for formation of a transmission beam using the forward fading information and the received reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50); and a forward processor having a transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 7 Kuwahara et al teaches a forward fading decoder for decoding forward fading information for each path fed back from a mobile station from the received reverse signal of the reverse processor; and a forward fading extractor for extracting a forward fading coefficient from the decoded forward fading information (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-60, col. 8, lines 24-50).

Regarding claim 8 Kuwahara et al teaches wherein if the decoded forward fading information is represented as complex information the forward fading extractor extracts a complex forward fading coefficient using a weight vector  $w$  and an estimated array vector used for formation of the transmission beam (col.3, lines 52-65, col. 5, lines 5-25).

Regarding claim 9 Kuwahara et al teaches herein if the decoded forward fading information is represented as quantitative information the forward fading extractor extracts a forward fading severity using a weight vector  $w$  and an estimated array vector used for formation of the transmission beam (col.3, lines 52-65, col. 5, lines 5-25).

Regarding claim 10 Kuwahara et al teaches wherein the forward fading information extraction unit further comprises a memory for storing a predetermined number of previous forward fading coefficients (col. 2, lines 15-25, col. 9, lines 42-55).

Regarding claim 11 Kuwahara et al teaches a forward fading power calculator for calculating forward fading power for each path based on the extracted forward fading information; an array vector calculator for calculating an array vector for each path from the received reverse signal; a transmission correlation matrix calculator for calculating a transmission correlation matrix based on the forward fading powers and the array vectors; and a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating the previous weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to the transmission beam generator(col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 12 Kuwahara et al teaches wherein the forward fading power calculator comprises an average reverse fading power calculator for calculating an average reverse fading power for each path from the reverse signal and a

Doppler frequency estimator for estimating a mobility of the mobile station, for calculating the forward fading power using the forward fading information, the reverse fading power, and the Doppler frequency according to a feedback delay time and a movement speed of the mobile station (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 13 Kuwahara et al teaches wherein the forward fading power calculator receives the extracted forward fading coefficient for each path and outputs forward fading power for each path if a variation of the feedback time delay is small (col. 4, lines 1-24, col. 8, lines 15-40, see above).

Regarding claim 14 Kuwahara et al teaches wherein the forward fading power calculator calculates a current forward fading coefficient for each path by a predetermined prediction method using the plurality of previous forward fading coefficients for each path, an average reverse fading power for each path, and the Doppler frequency for each path if a variation of the feedback time delay is great (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 15 Kuwahara et al teaches wherein the forward fading power calculator calculates the current forward fading coefficient for each path by a predetermined linear prediction method using the plurality of previous forward fading coefficients for each path, the average reverse fading power for each path, and the Doppler frequency for each path and then generates the forward fading power for each

path (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 16 Kuwahara et al teaches wherein the forward fading power calculator calculates a current forward fading severity for each path by a predetermined linear prediction method using a plurality of previous forward fading severities for each path, the average reverse fading power for each path and the Doppler frequency for each path and then generates the forward fading power for each path (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 17 Kuwahara et al teaches wherein the forward fading power calculator further comprises a mobility estimator for estimating the mobility of the mobile station and a selector for receiving the average reverse fading power for each path from the average reverse fading power calculator and the forward fading power for each path and selecting the forward fading power if the mobility is lower than a predetermined threshold and the average reverse fading power if the mobility is greater than the threshold (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55)..

Regarding claim 18 Kuwahara et al teaches wherein the mobility estimator estimates the Doppler frequency for each path from the received reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 19 Kuwahara et al teaches wherein the forward fading power calculator further comprises: a mobility estimator for estimating the mobility of the

mobile station; and a selector for receiving the average reverse fading power for each path from the average reverse fading power calculator and the forward fading power for each path and selecting the forward fading power if the mobility is lower than a predetermined threshold and the average reverse fading power if the mobility is greater than the threshold (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 20 Kuwahara et al teaches wherein the mobility estimator estimates the Doppler frequency for each path from the received reverse signal.

Regarding claim 21 Kuwahara et al teaches wherein the array vector calculator calculates an array vector directly from the reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 22 Kuwahara et al teaches wherein the transmission correlation matrix calculator calculates a transmission correlation matrix and the forward fading power (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 23 Kuwahara et al teaches wherein the weight vector calculator calculates a maximum unique vector corresponding to a maximum unique value of the transmission correlation matrix, normalizes the maximum unique vector, and outputs the normalized maximum unique vector as the weight vector (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 24 Kuwahara et al teaches wherein the transmission beam generator forms a transmission beam by generating as many duplication signals of a

transmission message as the number of antennas in the antenna array and multiplying the duplication messages by weight vector components (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claim 25 Kuwahara et al teaches a mobile station device in a mobile communication system, comprising:

- a forward processor for processing a received forward signal (col. 3, lines 13-31, col. 6, lines 13-62);

- a forward fading estimator for estimating forward fading information of the forward signal for each path (col. 6, lines 13-62, col. 7, lines 1-43));

- a forwarding fading encoder for combining the estimated forward fading information and encoding the combined forward fading information (col. 3, lines 13-65, col. 6, lines 13-62, col. 7, lines 1-43); and

- a reverse processor for multiplexing the encoded forward fading information with a transmission message and feeding back the forward fading information in the multiplexed signal to a base station (col. 8, line39-col. 9, line 10, see above).

Regarding claim 28 Kuwahara et al teaches wherein the forward fading estimator estimates complex forward fading information from the forward signal (col. 3, lines 13-65, col. 6, lines 13-62, col. 8, line39-col. 9).

Regarding claim 29 Kuwahara et al teaches wherein the forward fading estimator estimates forward fading severity information from the forward signal (col. 3, lines 13-65, col. 6, lines 13-62, col. 8, line39-col. 9).

Regarding claim 30 Kuwahara et al teaches wherein the reverse processor inserts the forward fading information into a predetermined reverse channel message for transmission (col. 3, lines 13-65, col. 6, lines 13-62, col. 8, line39-col. 9).

Regarding claim 31 Kuwahara et al teaches wherein the reverse processor transmits the forward fading information on a separately designated reverse channel (col. 3, lines 13-65, col. 6, lines 13-62, col. 8, line39-col. 9).

Regarding claim 32 Kuwahara et al teaches a mobile communication system comprising:

a base station device having a reverse processor for processing a reverse signal received through an antenna array, a forward fading information extraction unit for extracting forward fading information from the received reverse signal, a beam formation controller for generating a weight vector for formation of a transmission beam using the forward fading information and the received reverse signal, and a forward processor having a transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 3, lines 13-31, col. 6, lines 13-62, col. 7, lines 1-43); and

a mobile station device having a forward processor for processing a received forward signal, a forward fading estimator for estimating forward fading information of the forward signal for each path, a forwarding fading encoder for combining the estimated forward fading information and encoding the combined forward fading information, and a reverse processor for multiplexing the encoded forward fading information with a transmission message and feeding back the forward fading

information in the multiplexed signal to a base station (col. 8, line 39-col. 9, line 10, see above).

Regarding claim 33 Kuwahara et al teaches a transmitting method for a base station that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising the steps of:

processing a reverse signal received through the antenna array; extracting forward fading information from the processed reverse signal; generating a weight vector using the forward fading information and the received reverse signal; and forming a transmission beam for a transmission message based on the weight vector (col. 3, lines 13-32, col. 6, lines 13-63, col. 7, lines 1-43, col. 8, lines 39-50).

Regarding claim 34 Kuwahara et al teaches a communication method for a mobile station in a mobile communication system, comprising the steps of:

processing a received forward signal; estimating forward fading information of the forward signal for each path; combining the estimated forward fading information and encoding the combined forward fading information; and multiplexing the encoded forward fading information with a transmission message and feeding back the forward fading information in the multiplexed signal to a base station (col. 3, lines 13-32, col. 6, lines 13-63, col. 7, lines 1-43, col. 8, lines 39-50).

Regarding claim 35 Kuwahara et al teaches a communication method between a base station having an antenna array and a mobile station, comprising the steps of: estimating forward fading information of a forward signal received from the base station for each path, combining the estimated forward fading information, encoding the

combined forward fading information, and feeding back the encoded forward fading information to the base station in the mobile station (col. 3, lines 13-32, col. 6, lines 13-63, col. 7, lines 1-43, col. 8, lines 39-50); extracting the forward fading information and generating a weight vector using the extracted forward fading information in the base station; and forming a transmission beam for a transmission message based on the weight vector and outputting the transmission beam through the antenna array in the base station (col. 3, lines 13-32, col. 6, lines 13-63, col. 8, lines 39-50).

Regarding claim 36 Kuwahara et al teaches a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising:

a reverse processor for processing a reverse signal received through the antenna array; a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 3, lines 13-32, col. 6, lines 13-63, col. 7, lines 1-43, col. 8, lines 39-50); a forward fading power calculator for calculating a forward fading power for each path based on the extracted forward fading information; an array vector calculator for calculating an array vector for each path from the reverse signal; a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors (col. 3, lines 13-32, col. 6, lines 13-63, col. 8, lines 39-50); a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to a transmission beam generator; and a forward processor comprising

the transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 3, lines 13-32, col. 6, lines 13-63, col. 8, lines 39-50).

Regarding claim 37 Kuwahara et al teaches a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising (col. 2, lines 1-40):

a reverse processor for processing a reverse signal received through the antenna array (col. 3, lines 66-67);

a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 3, lines 13-32, col. 6, lines 13-63, col. 7, lines 1-43, col. 8, lines 39-50);

a forward fading power calculator for calculating an average reverse fading power and a Doppler frequency from the received reverse signal and calculating a current forward fading power for each path by a predetermined prediction method based on a plurality of previous forward fading coefficients for each path, the average reverse fading power, and the Doppler frequency (col. 3, lines 13-32, col. 6, lines 13-63, col. 8, lines 39-50);

an array vector calculator for calculating an array vector for each path from the reverse signal (col.3, lines 41-65, col. 8, lines 24-50, see above);

a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors (col.4, lines 30-65, see above);

a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to a transmission beam generator, and a forward processor comprising the transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 2, lines 1-41, col. 4, lines 5-67, col. 7, lines 1-43, col. 6, lines 13-63, col. 8, lines 39-50).

Regarding claim 38 Kuwahara et al teaches a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising:

a reverse processor for processing a reverse signal received through the antenna array (col. 3, lines 13-67, col. 7, lines 1-43);

a forward fading information extraction unit for extracting forward fading information from the received reverse signal ( col. 7, lines 1-43);

a forward fading power calculator for calculating forward fading power for each path based on the extracted forward fading information, calculating an average reverse fading power from the reverse signal, and selecting the forward fading power if the mobility of the mobile station is lower than a predetermined threshold and the average reverse fading power if the mobility of the mobile station is greater than the threshold (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50);

an array vector calculator for calculating an array vector for each path from the reverse signal (col. 3, lines 13-65, col. 8, lines 24-50, see above);

a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors (col.8, lines 5-40);

a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to a transmission beam generator (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50); and

a forward processor comprising the transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col.8, line 40-col. 9, line 11, see above).

Regarding claim 39 Kuwahara et al teaches a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising:

a reverse processor for processing a reverse signal received through the antenna array; a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 3, lines 13-31, col. 6, lines 13-62, col. 7, lines 1-43); a forward fading power calculator for calculating an average reverse fading power and a Doppler frequency from the received reverse signal, calculating a current forward fading power for each path by a predetermined prediction method

based on a plurality of previous forward fading coefficients for each path, the average reverse fading power (col. 3, lines 13-31, col. 6, lines 13-62), and the Doppler frequency, and selecting the forward fading power if the mobility of the mobile station is lower than a predetermined threshold and the average reverse fading power if the mobility of the mobile station is greater than the threshold; an array vector calculator for calculating an array vector for each path from the reverse signal (col. 9, lines 21-55); a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors; a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to a transmission beam generator (col. 9, lines 21-55, col. 10, lines 12); and a forward processor comprising the transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 3, lines 13-31, col. 6, lines 13-62).

Regarding claim 40 Kuwahara et al teaches a forward signal transmitting method for a base station that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising the steps of: extracting forward fading information from a reverse signal received through the antenna array; calculating a forward fading power for each path based on the extracted forward fading information (col. 3, lines 13-31, col. 6, lines 13-62, col. 7, lines 1-43); calculating an array vector for each path from the reverse signal; calculating a weight

vector based on the forward fading powers and array vectors and updating an existing weight vector with the calculated weight vector; and forming a transmission beam for a transmission message based on the weight vector and outputting the transmission beam through the antenna array (col. 3, lines 13-31, col. 6, lines 13-62, col. 8, lines 25-55).

Regarding claim 41 Kuwahara et al teaches a forward signal transmitting method for a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising the steps of:

extracting forward fading information from a reverse signal received through the antenna array and storing the extracted forward fading information; calculating an average reverse fading power and a Doppler frequency from the received reverse signal and calculating a current forward fading power for each path by a predetermined prediction method based on a plurality of previous forward fading coefficients for each path, the average reverse fading power, and the Doppler frequency (col. 3, lines 13-31, col. 6, lines 13-62, col. 7, lines 1-43); calculating an array vector for each path from the reverse signal; calculating a weight vector based on the forward fading powers and array vectors and updating an existing weight vector with the calculated weight vector(col. 9, lines 21-55, col. 10, lines 12); and forming a transmission beam for a transmission message based on the weight vector and outputting the transmission beam through the antenna array (col. 3, lines 13-31, col. 6, lines 13-62).

Regarding claim 42 Kuwahara et al teaches a forward signal transmitting method for a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising the steps of:

extracting forward fading information from a reverse signal received through the antenna array ( col. 7, lines 1-43); calculating forward fading power for each path based on the extracted forward fading information, calculating an average reverse fading power from the reverse signal, and selecting the forward fading power if the mobility of the mobile station is lower than a predetermined threshold and the average reverse fading power if the mobility of the mobile station is greater than the threshold; calculating an array vector for each path from the reverse signal (col. 9, lines 21-55, col. 10, lines 12); calculating a weight vector based on the forward fading powers and array vectors and updating an existing weight vector with the calculated weight vector (col. 9, lines 21-55, col. 10, lines 12); and forming a transmission beam for a transmission message based on the weight vector and outputting the transmission beam through the antenna array (col. 3, lines 13-31, col. 6, lines 13-62).

Regarding claim 43 Kuwahara et al teaches a forward signal transmitting method for a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising the steps of:

extracting forward fading information from a reverse signal received through the antenna array ( col. 7, lines 1-43); calculating an average reverse fading power and a

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Doppler frequency from the received reverse signal, calculating a current forward fading power for each path by a predetermined prediction method based on a plurality of previous forward fading coefficients for each path, the average reverse fading power, and the Doppler frequency, and selecting the forward fading power if the mobility of the mobile station is lower than a predetermined threshold and the average reverse fading power if the mobility of the mobile station is greater than the threshold (col. 9, lines 21-55, col. 10, lines 12); calculating an array vector for each path from the reverse signal; calculating a weight vector based on the forward fading powers and array vectors and updating an existing weight vector with the calculated weight vector (col. 9, lines 21-65, col. 10, lines 12); and forming a transmission beam for a transmission message based on the weight vector and outputting the transmission beam through the antenna array (col. 3, lines 13-31, col. 6, lines 13-62).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwahara et al (6597679) and further in view of Raleigh et al (6101399).

Regarding claim 26 Kuwahara et al teaches wherein if the forward signal forms an beam, the forward fading estimator estimates complex forward fading information and severity information (col. 3, lines 13-65, col. 6, lines 13-62, col. 7, lines 1-43 col. 8, line 39-col. 9). Kuwahara et al does not specifically teach omnidirectional beam. Raleigh et al teach omnidirectional beam (col. 8, lines 2-21). A communications system has a central communications station and at least one remote communications station, and the central station has an array antenna for generating an antenna beam pattern for the transmission of information signals received by the remote station. The method for adaptively controlling the beam pattern involves statistically characterizing a receive vector channel which represents a receive communications channel over which the signal energy is transferred form the remote unit to the central or base station. A beam pattern weight vector is generated based on the results of the statistical characterization of the receive channel vector and in accordance with a predetermined quality measurement of the signals received by the remote unit. A beam pattern is formed using the beam pattern weight vector. The base station transit antenna array is assumed to be comprised of M omnidirectional elements and the mobile unit equipped with a single omnidirectional antenna (col. 7, line 45-col. 8, line 50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Kuwahara et a by specifically adding feature omnidirectional beam in order to enhance system performance of the system purpose of increasing efficiency telecommunication system as taught by Raleigh et al.

Regarding claim 27 Kuwahara et al teaches the forward fading estimator estimates forward fading severity information (col. 3, lines 13-65, col. 6, lines 13-62, col. 7, lines 1-43 col. 8, line 39-col. 9). Kuwahara et al does not specifically teach omnidirectional beam. Raleigh et al teach omnidirectional beam (col. 8, lines 2-21). A communications system has a central communications station and at least one remote communications station, and the central station has an array antenna for generating an antenna beam pattern for the transmission of information signals received by the remote station. The method for adaptively controlling the beam pattern involves statistically characterizing a receive vector channel which represents a receive communications channel over which the signal energy is transferred from the remote unit to the central or base station. A beam pattern weight vector is generated based on the results of the statistical characterization of the receive channel vector and in accordance with a predetermined quality measurement of the signals received by the remote unit. A beam pattern is formed using the beam pattern weight vector. The base station transmit antenna array is assumed to be comprised of M omnidirectional elements and the mobile unit equipped with a single omnidirectional antenna (col. 7, line 45-col. 8, line 50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Kuwahara et al by specifically adding feature omnidirectional beam in order to enhance system performance of the system purpose of increasing efficiency telecommunication system as taught by Raleigh et al.

***Response to Arguments***

6. Applicant's arguments filed 5-7-04 have been fully considered but they are not persuasive. The examiner has thoroughly reviewed applications argument but firmly believes the cited references reasonably and properly meets the claim limitation. Applicant argument was that "forward fading information signal" and " weight vectors based on the forward fading power information signal". In response to applicant' arguments, examiner would like to point out that Kuwahara et al teaches base station using an adaptive array antenna and included in a radio communication system represented by a cellular radio communication system. The present invention is effective particularly in application to a system employing a code-division multiple access system (CDMA system) and controlling transmitting power for a downlink and various antennas (100) are distributed in the communication space. Predefined phase and propagation delay is maintained between the antenna. Specific weightage is added to output of modulator based on the received power control signal. The space correlation coefficient is estimated, based on the symbol series received from each antenna along particular communication path (col. 7, lines 1-50). Therefore, the mobile station back to the base station on the reverse link the power relative factors associated with power control to be utilized by the base station on the power control of the forward link to the mobile station ("the interference subspace estimating unit 107, the reduction of the influence of frequency difference between the uplink and the downlink is effective (when the FDD system is employed). Frequency conversion is executed for the

subspaces, the results of frequency conversion are weighted and added") (col. 7, lines 17-20 and 40-47).

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **KHAWAR IQBAL** whose telephone number is 703-306-3015.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **BANKS-HAROLD, MARSHA**, can be reached at 703-305-4379.

**Any response to this action should be mailed to:**

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Art Unit: 2686

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Commissioner of Patents and Trademarks  
Washington, D.C. 20231

**or faxed to:**

**(703) 872-9314 (for Technology Center 2684 only)**

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

**Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.**

**Khawar Iqbal**

  
**CHARLES APPIAH  
PRIMARY EXAMINER**